Operating and installation instructions

Electronic controller
Type: 2300 ME
for automatic filter engineBoll 6.49 ME
version 1.0 / 1.1 and version 2.0

NOTE:
Print document on both sides

Siemensstraße 10 - 14
50170 Kerpen
Germany
www.bollfilter.com

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Original operating instructions

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1 Preamble

1.1 General

These operating instructions are intended to assist you in familiarizing yourself with the control box from BOLL & KIRCH and in using it as intended.

These operating instructions provide important information about how to use the control box safely and correctly. Observance of these operating instructions will help avoid danger, reduce maintenance costs and downtimes and increase the reliability and service life of the control box. Read these operating instructions closely and carefully.

Provide supplements to these operating instructions in the form of instructions on the basis of national and international accident prevention regulations and environmental protection regulations. Ensure that the operating instructions are kept permanently available at the place of use of use of the control box. The operating instructions must be read and applied by every person instructed to carry out the following work:

- Installation
- Operation
- Maintenance
- Disposal

1.2 Warranty and liability

The “General Terms and Conditions of Delivery and Service” of Boll & Kirch Filterbau GmbH apply.

Boll & Kirch Filterbau GmbH shall not accept any warranty or liability claims in relation to personal and material damage if they are based on one or more of the following causes:

- improper use of the control box;
- non-observance of information and instructions, mandatory requirements and prohibitions included in the operating instructions;
- improper installation, operation and maintenance of the control box;
- unauthorized structural modifications to the filter;
- Emergencies caused by external influence or force majeure.

All information in these operating instructions is provided taking into account our current experience and findings, and is accurate to the best of our knowledge. Technical changes within the context of further development are reserved.

The text and diagrams do not necessarily correspond with the actual state as delivered. The diagrams are not to scale.

A spare parts list is included in the control cabinet diagrams to enable spare parts to be ordered.

1.3 Copyright

These operating instructions are an official document as defined by the law against unfair competition.

The copyright remains with

Boll & Kirch Filterbau GmbH

Siemensstraße 10 - 14

50170 Kerpen

Germany

These operating instructions are intended for the user of the control box and his employees. They contain texts, images and drawings that, without express approval by the manufacturer, may not be

- duplicated,
- distributed or
- otherwise disclosed, neither in full nor in part.

Any infringement will result in liability for damages.

2 Basic safety instructions

2.1 Warning signs and symbols

The following designations and symbols are used in the operating instructions to denote particularly important information:

DANGER!

Danger to life / Serious harm to health!

Indicates an imminently hazardous situation involving a high risk which, if not avoided, will result in death or severe (irreversible) injury.

ATTENTION

Material damage!

Denotes a situation that could lead to damage to the product itself or to objects in its vicinity.

NOTE

Denotes special user tips and other particularly useful or important information.

DISPOSAL

Denotes special measures for environmental protection.

2.2 Proper use

The control box has been constructed in accordance with the state-of-the-art in technology and generally recognized rules of safety. However, danger to the life and limb of the user or third parties and/or damage to the control box and other property can arise during use.

The control box may only be used for its intended purpose and if it is in perfect working order, and it must be used with regard to safety and dangers as stated in the operating instructions. Faults, especially those that could adversely affect safety, must be rectified immediately.

The control box is designed to be used for the control of the filter described in these operating instructions only. Any other use or use going beyond this shall be regarded as improper use. The manufacturer/supplier shall not be liable for damage resulting from improper use; the user shall bear the risk alone.

Usage for the intended purpose, i.e. proper use, also includes complying with the operating instructions for the control box and corresponding filter.

Safe and reliable operation can only be guaranteed if all the instructions, settings and performance limits for the control box (see control cabinet diagrams) and corresponding filter are complied with.

DANGER!

Risk of accidents due to improper installation

A failure of the device resulting from improper installation of the electronic control box or the connected equipment could cause severe personal injury or even fatal injury. Therefore, in addition to the general safety rules for equipment in industrial power installations, comply with the following points in particular:

- The installation of the control box should only be performed by qualified specialist staff in accordance with the conditions of IEC 364 and DIN VDE 0105 for electrical equipment.
- All applicable laws, conditions, regulations and instructions relating to the installation of electrical equipment must be observed in relation to the installation location.
- Settings for IP00 protection class devices (in the case of an opened control cabinet or where there are no covers) must only be made by authorized specialist staff, with the devices switched off and in compliance with the local safety and accident prevention regulations.
- The control box may only be operated in the permitted area of use.

2.3 Target group

The operating instructions apply for use by qualified specialist staff only.

2.4 Obligations of the user/operator

- Keep the operating instructions at hand at the place of use of the control box at all times.
- In addition to the operating instructions, observe and draw attention to generally applicable legal and other mandatory regulations relating to the prevention of accidents and environmental protection. Such obligations can include, for example, the provision/wearing of personal safety clothing and equipment.
- Provide supplements to the operating instructions in the form of instructions including supervision and reporting responsibilities to account for special operational considerations, e.g. with regard to the organization of work, work sequences and personnel employed.
- Only trained personnel who are familiar with the essential occupational health and safety regulations and have been provided with instruction in the handling of the control box are permitted to be deployed.
- Only personnel who have been specifically appointed by the user for the purpose are permitted to operate the control box or carry out any work of maintenance or repair on it.
- Observe all safety and hazard alerts on the control box (where provided).
- Make sure that all safety and hazard alerts on the control box are complete and legible at all times (where provided).
- Never make any modifications, additions or conversions to the control box which might adversely affect safety, without the manufacturer’s approval.
- The spare parts used must conform with the technical requirements specified by the manufacturer. This can be guaranteed by using original spare parts.

2.5 Selection and qualifications of staff

- All tasks on the control box must be carried out only by reliable personnel. Personnel must not be under the influence of drugs or medication. Statutory minimum age limits must be observed.
- Employ only trained and instructed personnel and set out clearly the individual responsibilities of the personnel for installation, operation and maintenance.

In these operating instructions the following qualifications are stipulated for the different areas of activity:

- Instructed persons means persons who have been instructed during instruction provided by the user with regard to the work assigned to them and possible hazards arising from improper conduct and about required safety devices and precautions.
- Specialist staff means persons who have the training, knowledge and experience, as well as familiarity with applicable regulations, to be able to carry out the work delegated to them and to recognize and avoid potential dangers themselves.
- An electrician means a person who has the training, knowledge and experience, as well as familiarity with applicable standards and regulations, to be able to carry out work on electrical equipment and to recognize and avoid potential dangers themselves. The electrician is qualified to work at the specific place of use at which they work and is familiar with the relevant standards and regulations.

In-house instruction must be provided, having regard to the technical qualifications of the specific individual concerned.

In addition to the safety instructions set out in these operating instructions, the following rules and regulations must also be complied with:

- the applicable accident prevention regulations
- occupational medicine-related regulations
- generally recognized rules of safety
- country-specific regulations
- proper use

In addition, these rules and regulations can also be supplemented by in-house regulations specified by the plant or company itself.

2.6 Organisational measures

2.6.1 General

- Follow the respective valid national and international accident prevention regulations.

2.7 Safety instructions for operating personnel

Refrain from any working practices which could

– pose a risk of danger to life and limb of the user or third parties,
– adversely affect the control box or other property,
– adversely affect the safety and operation of the control box,
– infringe the specified safety instructions.

2.7.1 Personal protective equipment

The protective clothing and equipment required by the company must be worn for all work on the controller. This includes: protective ear wear, safety shoes, a safety helmet (with face guard if required), protective clothing, protective gloves, and a face guard.

3 Overview of controller versions V1.0 / V1.1 / V2.0

Version V1.0

Control unit	Circuit diagram	Identification number:	Gear motor input voltage	Flushing valve	440 V AC / 24 V DC converter (installed on the housing)	440 V AC / 24 V DC converter (installed in the motor)	440 V AC / 24 V DC converter (installed in the controller)
DN 50	Z46788	4300771	24 V DC	Solenoid valve	yes	no	no
DN 80-100	Z46715	4300771	24 V DC	Solenoid valve	yes	no	no
DN 125-150	Z46724	4300848	440 V DC	Solenoid valve	no	yes	no
DN 200	Z46731	4300849	440 V DC	Solenoid valve	no	yes	no

Version V1.1 interim solution

Control unit	Circuit diagram	Identification number:	Gear motor input voltage	Flushing valve	440 V AC / 24 V DC converter (installed on the housing)	440 V AC / 24 V DC converter (installed in the motor)	440 V AC / 24 V DC converter (installed in the controller)
DN 50	Z46867	4300771	24 V DC	without	yes	no	no
DN 80-100	Z46862	4301048	24 V DC	3-way valve	yes	no	no
DN 125-150	Z46863	4301049	440 V DC	3-way valve	no	yes	no
DN 200	Z46864	4301050	440 V DC	3-way valve	no	yes	no

NOTE

The software for controller versions V1.0 and V1.1 is identical.

NOTE

The hardware for controller version V1.1 has an additional terminal compared to controller version V1.0, so that the 3-way valve can be activated.
Technical details can be found in the associated circuit diagrams.

Version V2.0

Control unit	Circuit diagram	Identification number:	Gear motor input voltage	Flushing valve	440 V AC / 24 V DC converter (installed on the housing)	440 V AC / 24 V DC converter (installed in the motor)	440 V AC / 24 V DC converter (installed in the controller)
DN 50	Z46756	4301025	24 V DC	without	no	no	yes
DN 80-100	Z46757	4301025	24 V DC	3-way valve	no	no	yes
DN 125-150	Z46758	4301026	24 V DC	3-way valve	no	no	yes
DN 200	Z46759	4301027	24 V DC	3-way valve	no	no	yes

NOTE

The circuit diagram used is part of these operating instructions and facilitates identification of the delivered controller version V1.0 / V1.1 or V2.0.

The controller version can be identified via the identification number on the controller type plate. The type plate is located on the inside of the switch cabinet door.

NOTE

The software of controller version V2.0 is different to V1.0 and V1.1, as this controller processes other inputs using an additional board. The basic operation remains the same.

NOTE

The hardware of controller version V2.0 is different to V1.0 and V1.1, as this controller has an additional board and another power pack.
Technical details can be found in the associated circuit diagrams.

4 Technical data of controller and control cabinet components

4.1 Power components

4.1.1 Supply

Supply L1-L2-L3 direct to 3-pole master switch – Q1 (T1-T2-T3)

4.1.2 Motor control

Controller versions	Motor connection -M1 (gear motor 1)	Motor connection -M2 (gear motor 2)	Motor connection -M3 (pump)
V1.0 / V1.1	on the motor contactor -Q2.1	on the motor contactor -Q3.1	on the motor contactor -Q4.1
V2.0	on the terminal strip -X1	on the terminal strip -X1	on the motor contactor -Q2

4.1.3 Power supply

Controller versions	Primary voltage	Control voltage	Supply voltage Control circuit board
V1.0 / V1.1	440 Volt 60 Hz	24 V DC	20 V AC
V2.0		24 V DC	

4.1.4 Fuse protection

Controller versions	Fuses in the switch cabinet	Amps
V1.0 / V1.1	F1 to F2	each 1 A T
V1.0 / V1.1	F3 to F4	each 1.6 A T
V1.0 / V1.1	F5 to F6	each 315 mA T
V2.0 DN50 - 100	F1	2.0 A slow-blow
V2.0 DN125 - 200	F1	4.0 A slow-blow

Controller versions	Fuses on the control circuit board	Amps
V1.0 / V1.1 / V2.0	F1	0.8 A slow-blow
V1.0 / V1.1 / V2.0	F2	2.0 A slow-blow

4.1.5 Overview of the reserve fuse kit

Controller versions	Filter size	Identification number:
V1.0 / V1.1	all sizes	4300946
V2.0	DN50 - 100	4301081
V2.0	DN125 - 200	4301082

4.2 Control circuit board inputs / outputs

4.2.1 Optocoupler inputs (E1 - E5), terminals 31 - 40

4.2.2 Digital inputs (DI1 - DI4), terminals 53 - 57 (V2.0 only)

NOTE

The digital inputs on the additional board for the analysis of other messages are only available from controller version V2.0.

4.2.3 Analogue input 4-20 mA, terminals 41 - 42

4.2.4 Live relay outputs

Controller versions	Outputs on the control circuit board	Terminals on the control circuit board
V1.0 / V1.1	VE1 - VN1 to VE3 - VN3	8 - 13
V2.0	VE1 - VN1 to VE3 - VN3 and M+ - M-	8 - 15

NOTE

The connections and designations are to be taken from the respective control cabinet diagrams, according to filter type.

4.2.5 Potential-free relay outputs

Outputs A1 - A5	Messages 1 - 5 (change-over contact)	Terminals 16 - 30

NOTE

The connections and designations are to be taken from respective control cabinet diagrams, according to filter type.

5 Operation

5.1 Device functions and control sequence

5.1.1 Overview of the electronic controller

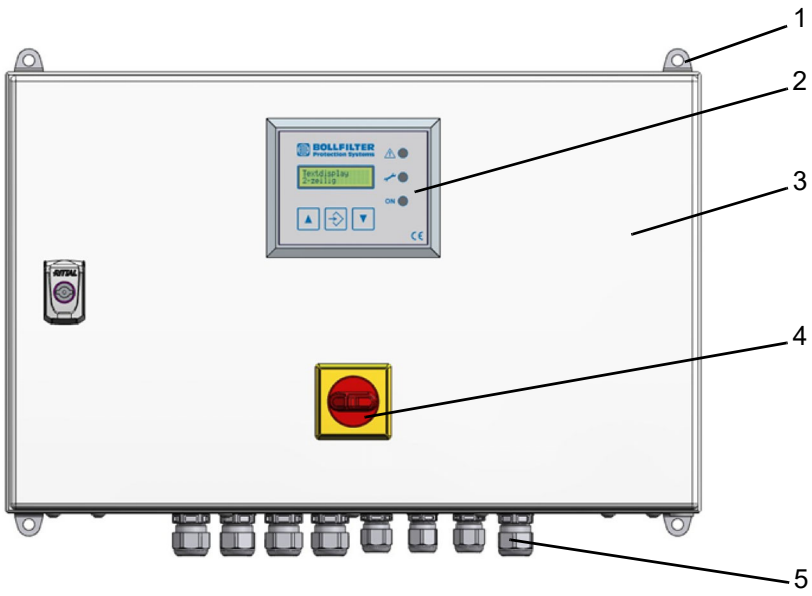


Fig. 5-1 Electronic controller type 2300 ME

1 Fastening
2 Display and operating elements
3 Housing
4 Master switch
5 Connection

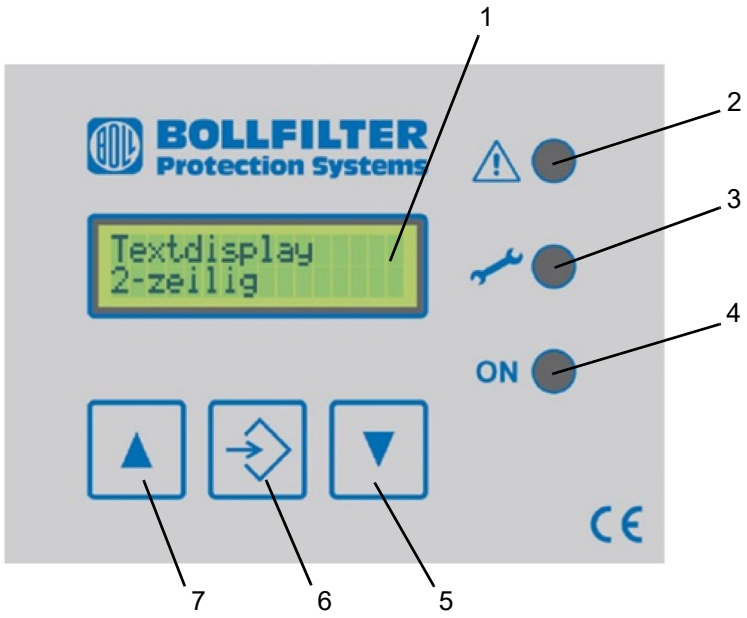


Fig. 5-2 Display and operating elements

1 Display screen for text display, 2 lines of 16 characters
2 "Alarm" LED (red)
3 "Service" LED (yellow)
4 "Operation" LED (green)

Overview of the key assignment 5 - 7:

Keys Fig. 5-2	Meaning	Designation of the keys for V1.0/V1.1 (German)	Designation of the keys for V1.0/V1.1 (English)	Designation of the keys for V2.0
5	When pressed, acknowledges the alarm messages	Z	C	C
6	When pressed, triggers manual flushing	S	F	F
7	When pressed, shows the number of flushes	Q	Q	Q

NOTE

From controller version V2.0, keys 5 - 7 have been standardised in German and English.

5.1.2 Master switch operation feedback contact

When the master switch is in the "On" position, a contact is made.

5.1.3 Control voltage monitoring

As soon as the master switch is actuated, the power supply is activated and the controller is working properly, the green "Operation" LED lights up and the "Control voltage monitoring" relay is activated. In the event of operating voltage failure or a fuse fault on the control circuit board, no LED lights up and the "Control voltage monitoring" relay is no longer activated.

5.1.4 Motor fault -M1, -M2, -M3 (only applies to V1.0/V1.1)

If a motor protection switch (-Q2 or -Q3 or -Q4) has tripped, a fault will be reported on the display and the “Alarm” LED (red) will light up on the controller display, i.e. message via input E4 on the board.

Once the fault has been remedied, the user has to acknowledge the alarm message by pressing the Q key.

NOTE

From controller version V2.0 motor faults -M1, -M2 and -M3 are individually analysed from the additional board, so that the 4 alarms can be analysed individually and displayed directly on the controller display.

5.1.5 Motor fault -M1, -M2 (applies from V2.0)

If gear motors -M1 and/or -M2 have an internal fault (red LED/error status: overtemperature/overcurrent/overvoltage), a message will be issued via digital outputs D02 of motor -M1 and/or -M2.

If the message remains for more than 3 seconds on digital inputs DI1 and/or DI2 on the additional board (DI1 for motor -M1/DI2 for motor -M2), an alarm message will appear on the display and the “Alarm” LED (red) will light up on the controller display.

The flushing will only be completely aborted if motors -M1 and -M2 malfunction.

NOTE

For filter size DN50 there is only one motor -M1. Therefore, with that filter size, flushing is interrupted as soon as motor -M1 has a fault.

The internal gear motor errors are deleted only if the power supply to the motors was interrupted.

Procedure:

1) Switching the controller off and on
2) Unplugging and plugging in the motor cable

The gear motor is defective and must be replaced if the red motor LED lights up again after interrupting the power supply.

Once the fault has been remedied, the user has to acknowledge the alarm message by pressing the Q key.

5.1.6 Pump motor fault -M3 (applies from V2.0)

If the motor protection switch -FC1 for the pump motor -M3 has been triggered and the message has appeared on digital input DI3 from the additional board, an alarm message will appear on the display and the “Alarm” LED (red) will light up on the controller display.

The flushing will be completely aborted as soon as the pump motor -M3 malfunctions.

The pump motor fault is only deleted if the switch of the motor protection switch -FC1 is switched back on manually. To operate the motor protection switch, the controller must be switched off and the switch cabinet opened.

Once the filter has been remedied, the user must acknowledge the alarm message by pressing the Q key.

5.1.7 Valve fault (applies from V2.0)

If the 3-way valve switch-over does not work and thus the respective end positions (2 limit switches per valve) are not reached in time after activating the valve during backflushing, an alarm message will be shown on the display via digital input DI4 on the additional board and the “Alarm” LED (red) will light up on the controller display.

The flushing is not aborted in the event of this alarm message.

5.1.8 Oil pressure fault

If parameter P22 (see explanation in section **5.5.14 P22 pressure switch (only applies to V1.0/V1.1)**) has been used to set that a pressure switch is installed, in the event that there is no operating pressure on the filter, a fault is reported on the display with a message via input E4 on the board. Once the fault has been remedied, the user has to acknowledge the alarm message by pressing the Q key.

NOTE

From controller version V2.0, the oil pressure fault is analysed individually via input E4, as the motor faults are analysed by the additional board.

Applies from V2.0:

Flushing is not possible in the event of this alarm message. This alarm message is automatically deactivated by the controller after 5 seconds as soon as the oil pressure switch -B3 is no longer activated.

This alarm message can also be acknowledged by pressing the Q key.

5.1.9 DP too high backflushing filter (ΔP100 %)

The signal transmitter is a pressure switch contact which is connected to the "Differential pressure indicator DP too high, backflushing filter" optocoupler input. If the message is active for longer than 2 seconds, an alarm message appears in the display screen and the red "Alarm" LED lights up. Once the fault has been remedied, the user has to acknowledge the alarm message by pressing the Q key.

NOTE

This message is an alarm message, which indicates that the differential pressure is too high. The red “Alarm” LED lights up and a check is necessary.

5.1.10 Differential pressure too high, flushing oil treatment cartridge alarm

Signal encoder is a pressure switch contact that is connected to the optocoupler input "Differential pressure indicator DP too high flushing oil treatment". If the message exists for a longer than that set via parameter P7, an alarm message is output to the display. After cleaning of the fault, the operator must acknowledge the alarm message by pressing the Q key.

5.1.11 Operating hours counter

The operating hour counter records the operating hours when the controller is switched on. The operating hours are displayed by pressing the C key several times (for more details, see **5.1.15 C key (additional functions display)**).

5.1.12 Error memory

The internal error memory shows all errors and events, incl. an indication of the operating hours. Reading out the error memory is only intended for authorised individuals.

5.1.13 Differential pressure transmitter 4-20 mA (optional)

If a differential pressure transmitter (three-wire) is operated with 4-20 mA, the control box can be changed from a digital differential pressure measurement device (DPS = differential pressure switch) to an analogue differential pressure measurement device (DPT = differential pressure transmitter) (for a detailed setting explanation, see the section “P15 DP-Select”).

5.1.14 DPT-Alarm

The alarm message “DPT alarm” is shown on the display when a differential pressure transmitter with 4-20 mA (three-wire) is used, parameter P15 “DPT” has been selected and the minimum current of 4 mA cannot be measured. In addition, the “Alarm” LED (red) lights up and alarm output A5 (terminals 28, 29 and 30, see circuit diagrams) “Collective fault” is activated. Once the fault has been remedied, the user has to acknowledge the alarm message by pressing the Q key.

5.1.15 C key (additional functions display)

When key C (additional function display) is pressed once, the number of flushing cycles which have been performed is shown on the screen for 3 seconds.

NOTE

When key C is pressed multiple times, the following additional information is shown each time it is pressed in the indicated order:

- Current differential pressure, provided a differential pressure transmitter is installed and parameter P15 selection “DPT” has been set in the controller.
- Operating hours when controller is switched on.
- DP alarm (flushing frequency monitoring) ON or OFF
- Current remaining time “DP1 delayed”, provided a time delay has been set in the controller using parameter “P16 time delay for differential pressure” and the contact from input E1 (terminals 39 + 40, see circuit diagram) has been closed for the flushing differential pressure ΔP75%.
- Current remaining time “DP2 delayed”, provided a time delay has been set in the controller using parameter “P16 time delay for differential pressure” and the contact from input E2 (terminals 37 + 38, see circuit diagram) has been opened for the flushing differential pressure ΔP100%.
- Current remaining time “P7 cartridge alarm”, provided the contact from input E5 (terminals 31 + 32, see circuit diagram) has been opened for “Differential pressure too high flushing oil treatment cartridge alarm”.

5.1.16 DP alarm (only V1.0/V1.1/DP flush. info (from V2.0))

If a "DP flushing" has been activated before the "Time-dependent backflush trigger" period elapses, the message "DP alarm" (V1.0/V1.1 only) / “Flushed by DP” (from V2.0) appears on the display and the "Service" LED (yellow) lights up.

NOTE

This message is an indicator message, which indicates an increased flushing frequency. Only the yellow “Service” LED lights up, and a check is recommended. This so-called flushing frequency monitoring can be deactivated via parameter P8 if necessary (see **5.5.6 P8 DP alarm (V1.0/V1.1 only) / DP flush. Info (from V2.0)**).

NOTE

From controller version V2.0, the indicator message (yellow LED) “DP alarm” has been changed to “Flushed by DP”, in order to avoid confusion with the alarm message (red LED) “DP too high”.

NOTE

The alarm outputs were modified in the software version from 06/07/2023. Please note the table in **6 Control box description, function and setting values**.

5.1.17 Message A4 "Flushing Active"

Output A4 “Flushing active” (terminals 25, 26 and 27, see control cabinet wiring diagrams) is activated as soon as a flushing has been triggered at the filter.

5.1.18 Time delay differential pressure ΔP75% and ΔP100%

The differential pressure signals “DP flushing [75%]” and “DP too high [100%]” of the connected differential pressure measuring device (differential pressure switch [DPS] or differential pressure transmitter [DPT]) can be delayed depending on the application (for a detailed explanation of the settings, see **5.5.10 P16 Differential pressure delay time**).

NOTE

The time delay of the differential pressure is deactivated in the factory setting.

5.1.19 “Flow monitor” alarm

NOTE

The alarm outputs were modified in the software version from 06/07/2023. Please note the table **6 Control box description, function and setting values**.

The “Flow monitor alarm” message is shown on the display if the signal from the flow monitor could not be read for 5 seconds in input E3. In addition, the “Alarm” LED (red) lights up and alarm output A3 “Flow monitor alarm”, as well as alarm output A5 “Common alarm”, is activated.

While this alarm is enabled, both flushing and “Refill oil” mode are locked. Once the fault has been remedied, the user has to acknowledge the alarm message by pressing the Q key.

5.1.20 Operating voltage alarm message

The “Operating voltage” alarm message is shown on the display when the board supply voltage is too low. In addition, the “Alarm” LED (red) lights up and alarm output A5 (Common alarm) is activated.

NOTE

Please check the power supply.

Once the fault has been remedied, the user has to acknowledge the alarm message by pressing the Q key.

5.2 Display for "Operation" mode

The green "Operation" LED (green) lights up once the power supply has been switched on and the controller is at operation level ("Operation" mode).

5.3 Text messages

5.3.1 Text display after switching on

BOLL & KIRCH	Company name
xxxxxxxxxx	Programme number

After a short delay, the 6.49 ME controller type is displayed in the second line of the display.

6.49 ME	Controller type 19 (only applies to V1.0/V1.1)

NOTE

From controller version V2.0, the filter size can be adjusted.

- 6.49 ME DN50
- 6.49 ME DN65 - 150
- 6.49 ME DN200

5.3.2 Text display in "Operation" mode

Forced fl. 00:01	Remaining time till forced flushing is triggered 00 h 01 min
C - F - Q	Reference to keys

NOTE

From controller version V2.0, keys 5 - 7 have been standardised in German and English. See table in section **5.1.1 Overview of the electronic controller**.

When flushing has been triggered, the following messages appear in the first line (depending on the source):

manual flushing	When flushing is triggered by the F key
forced flushing	When flushing is triggered via time-controlled backflushing
DP flushing	When flushing is triggered by backflushing filter differential pressure

When flushing has been triggered, the following messages may in the second line (depending on the source):

Flush. time 3s	Remaining flushing time

NOTE

3S indicates that the remaining flushing time is 3 seconds.

If the C key is pressed, the following message appears on the display:

No. of flushes

xxxxxx cycles Number of flushing cycles

The number of flushing cycles is saved and backed up in the event of a mains failure.

5.3.3 Alarm messages

NOTE

- The "Alarm" LED (red) comes on for each alarm message.
- All alarm messages are saved an backed up to protect against mains failure.
- In alternation with the operation messages, the alarm message is output every 2 seconds to the second line of the display.
- Once the Q key is pressed, the alarm messages are deleted, however, only once the source of the alarm has been cleared. If the source of the alarm has not been cleared, the alarm message reappears.

Overview of the alarm messages on the display:

Alarm messages on the display (red “Alarm” LED)	Alarm description	Controller version V1.0/V1.1	Controller version V2.0
motor fault -M1, -M2, -M3	Motor faults in the following components: Gear motor 1 Gear motor 2 Pump	X	
Oil pressure fault	Pressure switch fault Oil pressure -B3	X	X
motor fault -M1	Motor fault from gear motor 1		X
motor fault -M2	Motor fault from gear motor 2		X
Pump motor fault -M3	Motor fault from the pump		X
DP too high	Differential pressure too high Filter ΔP 100%	X	X
cartridge alarm	Differential pressure too high, flushing oil treatment ΔP 100%	X	X
Flow monitor alarm	If flow monitor signal -B2 is lost	X	X

Alarm messages on the display (red “Alarm” LED)	Alarm description	Controller version V1.0/V1.1	Controller version V2.0
Valve fault	Error when monitoring end positions -KK1	X	X

Indicator message on the display with parameter P8 switched on (yellow “Service” LED)	Alarm description	Controller version V1.0/V1.1	Controller version V2.0
DP alarm	Backflushing triggered by differential pressure Filter ΔP 75%	X	
Flushed by DP	Backflushing triggered by differential pressure Filter ΔP 75%		X

In the event the differential pressure is measured using differential pressure transmitter (DPT) [optional]	Alarm description	Controller version V1.0/V1.1	Controller version V2.0
DPT alarm	In the event input signal 4 mA is defective	X	X

NOTE

With controller version V1.0/V1.1, four different alarms were analysed via input E4 on the board with an alarm message on the display.

5.4 Setting and operation

5.4.1 Setting level - Viewing and selecting parameters

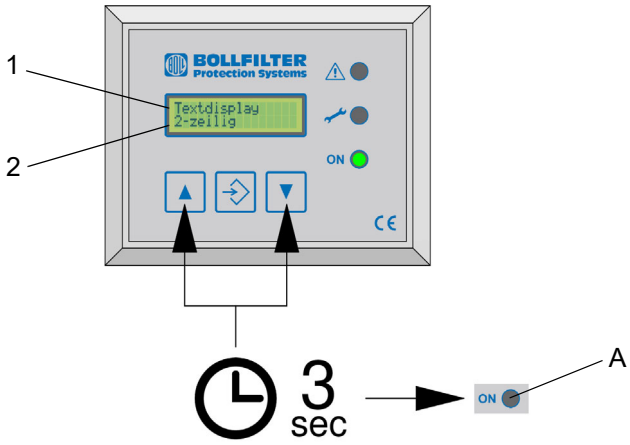


Fig. 5-3 Setting level - Viewing and selecting parameters

1	Parameter	A	Green LED turns off
2	Parameter value		

In order to access the “Selecting parameters and viewing parameters” setting level, press the keys ▲ and ▼ together until the green “Operation” LED turns off (approximately 3 seconds). The first display line shows the parameter and the second line shows the parameter value. All parameters can now be displayed by repeatedly pressing the ▲ or ▼ key.

5.4.2 Setting level - Changing and saving parameters

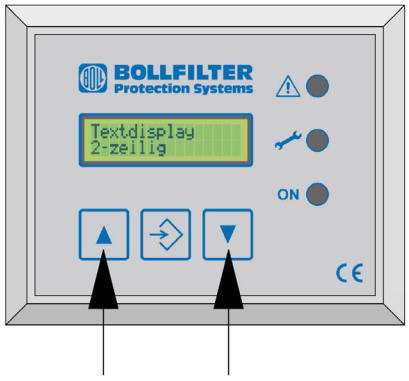


Fig. 5-4 Setting level - Changing parameters

The respective parameter can be selected by repeatedly pressing the ▲ or ▼ keys.

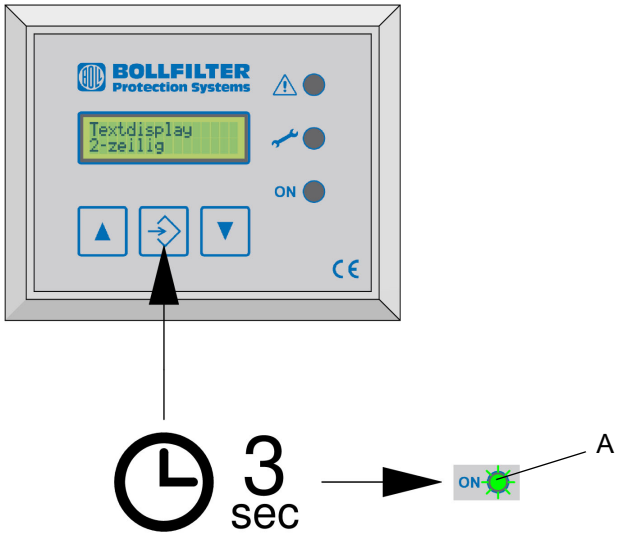


Fig. 5-5 Setting level - Changing and saving parameters

A Green LED flashes

In order to access the setting level - Changing and saving parameters, press the middle key until the green "Operation" LED flashes (approximately 3 seconds).

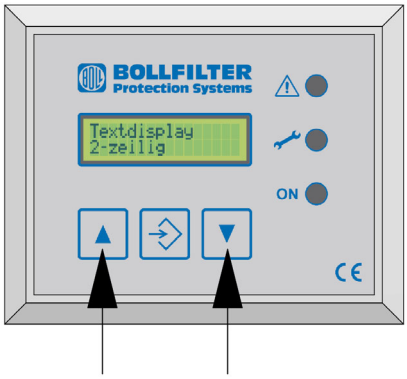


Fig. 5-6 Setting level - Changing parameters

The parameter can now be changed by repeatedly pressing the ▲ or ▼ keys.

To change a numerical value (for e.g. parameter P4 backflushing time in seconds), numbers 0 - 9 can be changed by repeatedly pressing the ▲ or ▼ keys.

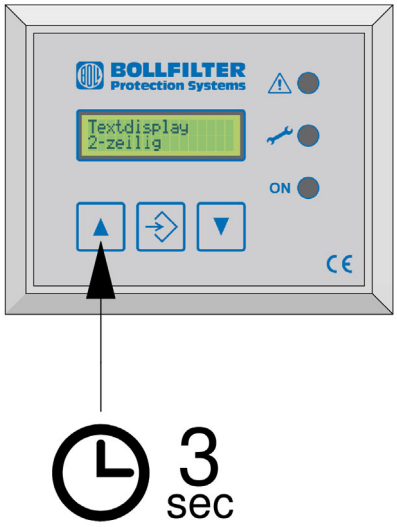


Fig. 5-7 Setting level - Changing parameters (numerical value)

By pressing the left key (approximately 3 seconds), the cursor can be set to the next digit.

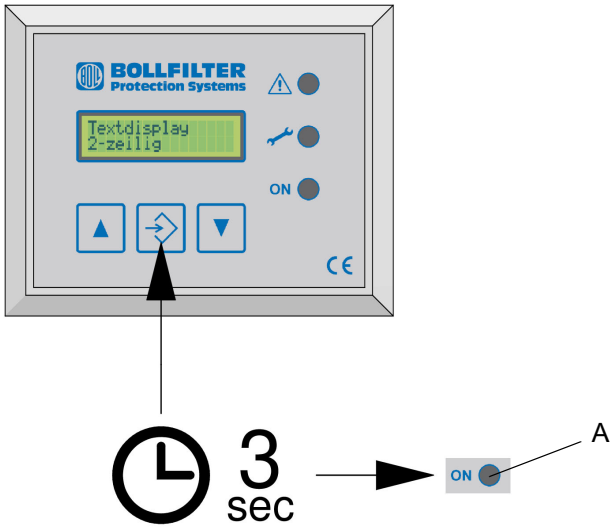


Fig. 5-8 Setting level - Saving parameters

A Green LED turns off

In order to save the value and return to the setting level Selecting parameters and viewing parameters, press the middle key until the flashing green "Operation" LED is turns off (approximately 3 seconds).

5.4.3 Return to operation level

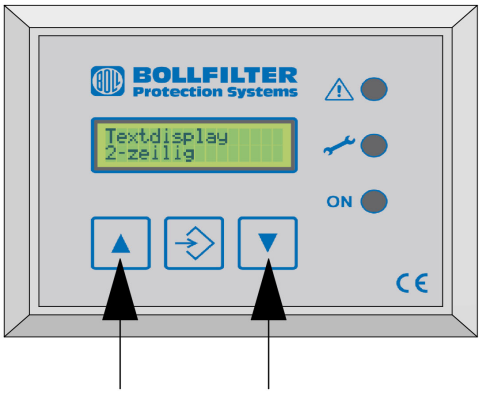


Fig. 5-9 Return to operation level

The operation level can be accessed by repeatedly pressing the ▲ or ▼ keys until the display shows “back one menu level”.

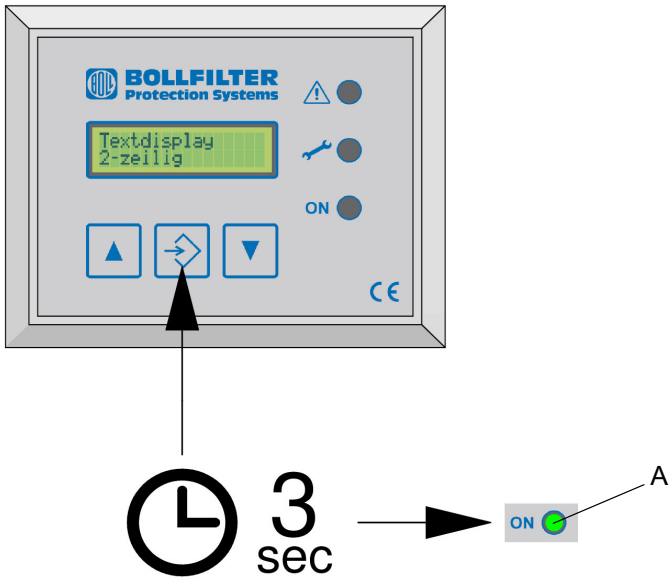


Fig. 5-10 Return to operation level

A Green LED turns on

To return to the operation level and save the settings, the middle key must be pressed for approx. 3 seconds, once the “one menu level back” display message has been selected using the ▲ or ▼ key.

5.5 List and description of parameters

5.5.1 P0 Filter type

Factory setting	Initial value 19
Text display, line 1	**P0 filter type**
Text display, line 2	**6.49 ME**

NOTE

From controller version V2.0, the filter size can be adjusted.

- 6.49 ME DN50
- 6.49 ME DN65 - 150
- 6.49 ME DN200

5.5.2 P2 Time-controlled backflushing

Adjustable in steps of one hour	Range 0 - 59 h
Factory setting	Initial setting 2 h
Text display, line 1	**P2 forced flush.**
Text display, line 2	**XXX hours**

5.5.3 P3 Time-controlled backflushing

Adjustable in steps of one minute	Range 0 - 59 min
Factory setting	Initial value 0 min
Text display, line 1	**P3 forced flush.**
Text display, line 2	**XXX minutes**

5.5.4 P4 Backflushing time

Adjustable in steps of one second	Range 30 - 300 s
Factory setting	Initial value 60 s
Text display, line 1	**P4 backflushing time**
Text display, line 2	**XXX seconds**

NOTE

(only applies to controller version V1.0 for filter type 6.49 ME DN65 - DN200)

When adjusting the backflushing time (standard: 60 s) time relay KF1 must also be set to half of the backflushing time.

NOTE

(only applies to controller version V1.0 for filter type 6.49 ME DN50)

When adjusting the backflushing time (standard: 30 s) time relay KF1 must always be set to the same backflushing time!

NOTE

From controller version V2.0, the backflushing time is preset after selecting the filter size.

- 6.49 ME DN50 = 30 s
- 6.49 ME DN65 - 150 = 60 s
- 6.49 ME DN200 = 120 s

NOTE

Please observe the attached tables for setting P4 (V1.0/V1.1/V2.0) and KF1 (V1.0/V1.1 only)!

P4 setting - version V1.0

Control unit	Circuit diagram	Identification number:	Flushing valve	Backflushing time parameter P4
DN 50	Z46788	4300771	Solenoid valve	30 s
DN 80-100 *)	Z46715	4300771	Solenoid valve	60 s
DN 125-150 *)	Z46724	4300848	Solenoid valve	60 s
DN 200 *)	Z46731	4300849	Solenoid valve	120 s

P4 setting (interim solution) - version V1.1

Control unit	Circuit diagram	Identification number	Flushing valve	Backflushing time parameter P4
DN 50	Z46867	4300771	without	30 s
DN 80-100 *)	Z46862	4301048	3-way valve	70 s
DN 125-150 *)	Z46863	4301049	3-way valve	70 s
DN 200 *)	Z46864	4301050	3-way valve	130 s

*) The backflushing time P4 deviates in the case of controller version V1.1 as compared to V1.0, as the changeover time for the 3-way valve must be taken into account with V1.1.

P4 setting - version V2.0

Control unit	Circuit diagram	Identification number	Flushing valve	Backflushing time parameter P4
DN 50	Z46856	4301025	without	30 s
DN 80-100 *)	Z46857	4301025	3-way valve	60 s
DN 125-150 *)	Z46858	4301026	3-way valve	60 s
DN 200 *)	Z46859	4301027	3-way valve	120 s

*) The backflushing time P4 deviates in the case of controller version V2.0 compared to V1.1, as in V2.0, the changeover time for the 3-way valve has been taken into account in the software.

NOTE

From controller version V2.0, the backflushing has been optimised with an alternating control of the 3-way valve, i.e. with the help of this control, filters 1 and 2 are always controlled alternately.

5.5.4.1 Time relay KF1 (only applies to V1.0/V1.1)

NOTE

Please note that the KF1 time relay setting for controller version V1.1 differs to V1.0, as with controller version V1.1 a 3-way valve is controlled.

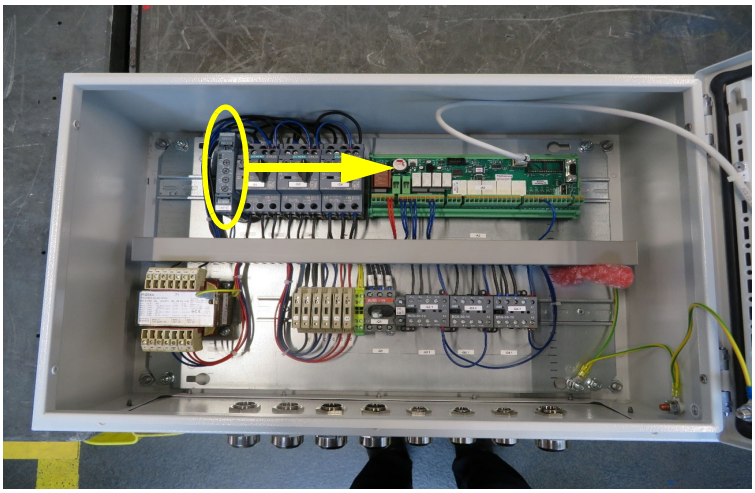
KF1 setting - version 1.0

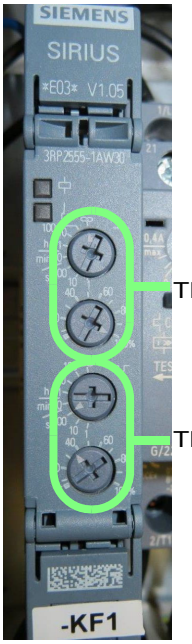
Control unit	Circuit diagram	Identification number:	TH	TL
DN 50	Z46788	4300771	30 s	30 s
DN 80-100	Z46715	4300771	30 s	30 s
DN 125-150	Z46724	4300848	30 s	30 s
DN 200	Z46731	4300849	60 s	60 s

KF1 setting (interim solution) - version V1.1

Control unit	Circuit diagram	Identification number	TH	TL
DN 50	Z46867	4300771	30 s	30 s
DN 80-100	Z46862	4301048	∞ s *)	35 s
DN 125-150	Z46863	4301049	∞ s *)	35 s
DN 200	Z46864	4301050	∞ s *)	65 s

*) Meaning of the "∞" symbol = continuous time





Corrective action:
Correct the time relay setting by turning the adjustment wheels on the time relay. The adjustment wheels can then be secured against unintentional adjustment using sealant or similar.

ATTENTION

The power supply must be interrupted before setting the time relay KF1, so that KF1 is not damaged.

5.5.5 P7 Delay time cartridge alarm

Adjustable in steps of 10 seconds	Range 10 - 600 s
Factory setting	Initial value 20 s
Text display, line 1	**P7 cartridge al.**
Text display, line 2	**XXX seconds**

5.5.6 P8 DP alarm (V1.0/V1.1 only) / DP flush. Info (from V2.0)

Setting	Off / On
Factory setting	Initial value
	ON
Text display, line 1	**P8 DP alarm (V1.0/V1.1 only) / DP flush. Info (from V2.0)**
Text display, line 2	**OFF**
or	
Text display, line 2	**ON**

NOTE

The “DP alarm” message (V1.0/V1.1 only) / “DP flush. info (from V2.0)” with the P8 parameter activated is an indicator message that indicates an increased flushing frequency. With this message, only the yellow “Service” LED lights up, and a check is recommended.

NOTE

From controller version V2.0, the parameter “P8 DP alarm” is changed to “P8 DP flush. Info”, in order to avoid confusion with the “DP too high” alarm message (red LED).

5.5.7 P11 Language

German, English, French, and Spanish are available as operating languages.

Setting	D German
	EN English
Factory setting	Initial value EN
	English
Text display, line 1	**P11 language**
Text display, line 2	**EN English**

5.5.8 P12 Testcode

NOTE

Test code P12 is divided into two sections:

- Advanced settings:
  In the first panel, entering a test code opens an advanced settings level in which additional parameters (e.g. P15, P16, and P17) can be set.
  (For a detailed description, see section “P15 DP selection” and P16 “DP differential pressure time delay”).
- Test mode:
  In the second panel, entering the test code activates test mode, which is only intended for authorized individuals.
  In addition, the internal fault memory can be saved onto a USB stick.

Adjustable in steps of one	Range 0 to 9999
Factory setting	Initial value 0
Text display, line 1	**P12 testcode**
Text display, line 2	**XXXX**

5.5.9 P15 DP-Select "Differential pressure switch or differential pressure transmitter"

NOTE

Test code 44 can be used to open an advanced setting which makes it possible to select a differential pressure analysis between the differential pressure switch (DPS = standard) and differential pressure transmitter (DPT = optional).
The advanced setting “P15 DP selection” is only required if a differential pressure transmitter (output signal: 4-20 mA and electrical connection type: three-wire) is used to control the filter.
(For a detailed description of settings and operation, see Fig. 4.6)

NOTE

In the factory setting, the differential pressure analysis by differential pressure switch (DPS) is activated.

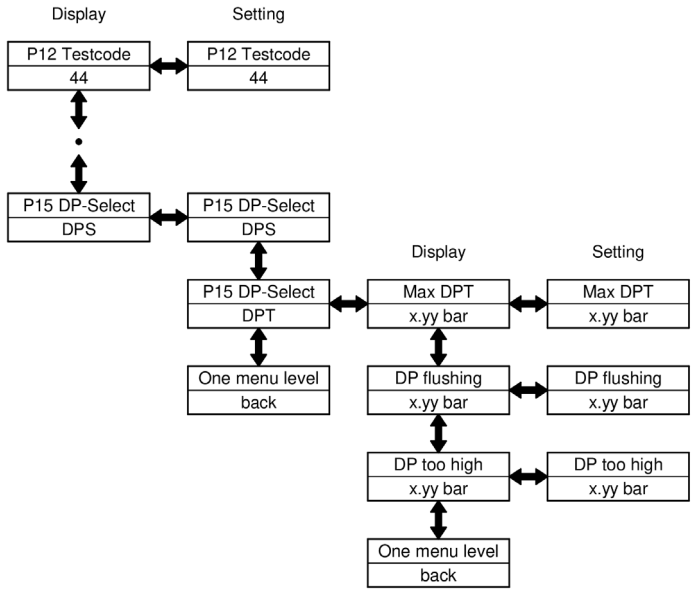


Fig. 5-11 Setting and operation

Setting	DPS / DPT
Factory setting	Initial value DPS
Text display, line 1	**P15 DP select**
Text display, line 2	DPS
or	
Text display, line 2	DPT

5.5.9.1 "MAX DPT" setting

NOTE

The maximum measurable differential pressure of the installed differential pressure transmitter must be set prior to commissioning.

Setting	Range 0.00 - 9.99 bar
Factory setting	Initial value 1.00 bar
Text display, line 1	MAX DPT
Text display, line 2	X.YY bar

5.5.9.2 Setting "DP flushing"

NOTE

The differential pressure signal "Differential pressure flushing ΔP 75%" must be set prior to commissioning.

Setting	Range 0.00 - 9.99 bar
Factory setting	Initial value 0.60 bar
Text display, line 1	DP flushing
Text display, line 2	X.YY bar

5.5.9.3 Setting "DP too high"

NOTE

The differential pressure signal "Differential pressure too high ΔP 100%" must be set prior to commissioning.

Setting	Range 0.00 - 9.99 bar
Factory setting	Initial value 0.80 bar
Text display, line 1	DP too high
Text display, line 2	X.YY bar

5.5.10 P16 Differential pressure delay time

NOTE

Entry of **Testcode 10** opens an advanced setting, which enables selection of a time delay for the differential pressure signals ΔP 75% and ΔP 100%.
(Detailed explanation on setting and operation, see Fig. 5.12)

NOTE

The time delay is deactivated in the factory setting.

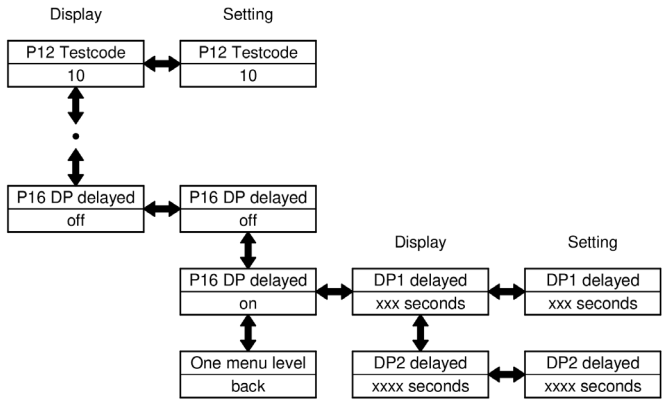


Fig. 5-12 Differential pressure time delay

5.5.10.1 Time delay setting "Differential pressure flushing ΔP75%"

Adjustable in steps of one second	Range 1 - 600 sec
Factory setting	Initial value 20 sec
Text display, line 1	DP1 delayed
Text display, line 2	XXX seconds

5.5.10.2 Time delay setting "Differential pressure too high ΔP100%"

Adjustable in steps of one second	Range 1 - 1800 sec
Factory setting	Initial value 1200 sec
Text display, line 1	DP2 delayed
Text display, line 2	XXX seconds

NOTE

From controller version V2.0, the DP2 time delay has been adjusted to 40 seconds for procedural reasons, when the time delay is activated.

5.5.11 P17 alarm relays A2, A3, A4, A5 (configurable alarm outputs)

NOTE

Entry of **Testcode 75** opens an advanced setting that enables configuration of the alarm outputs A2, A3, A4 and A5.
The advanced setting “P17 alarm relays A2, A3, A4, A5” is necessary if the customer requires alarm outputs that differ from the standard system level (see standard control cabinet diagrams).
(See Fig. 5.13 for detailed description of Adjustment and operation)

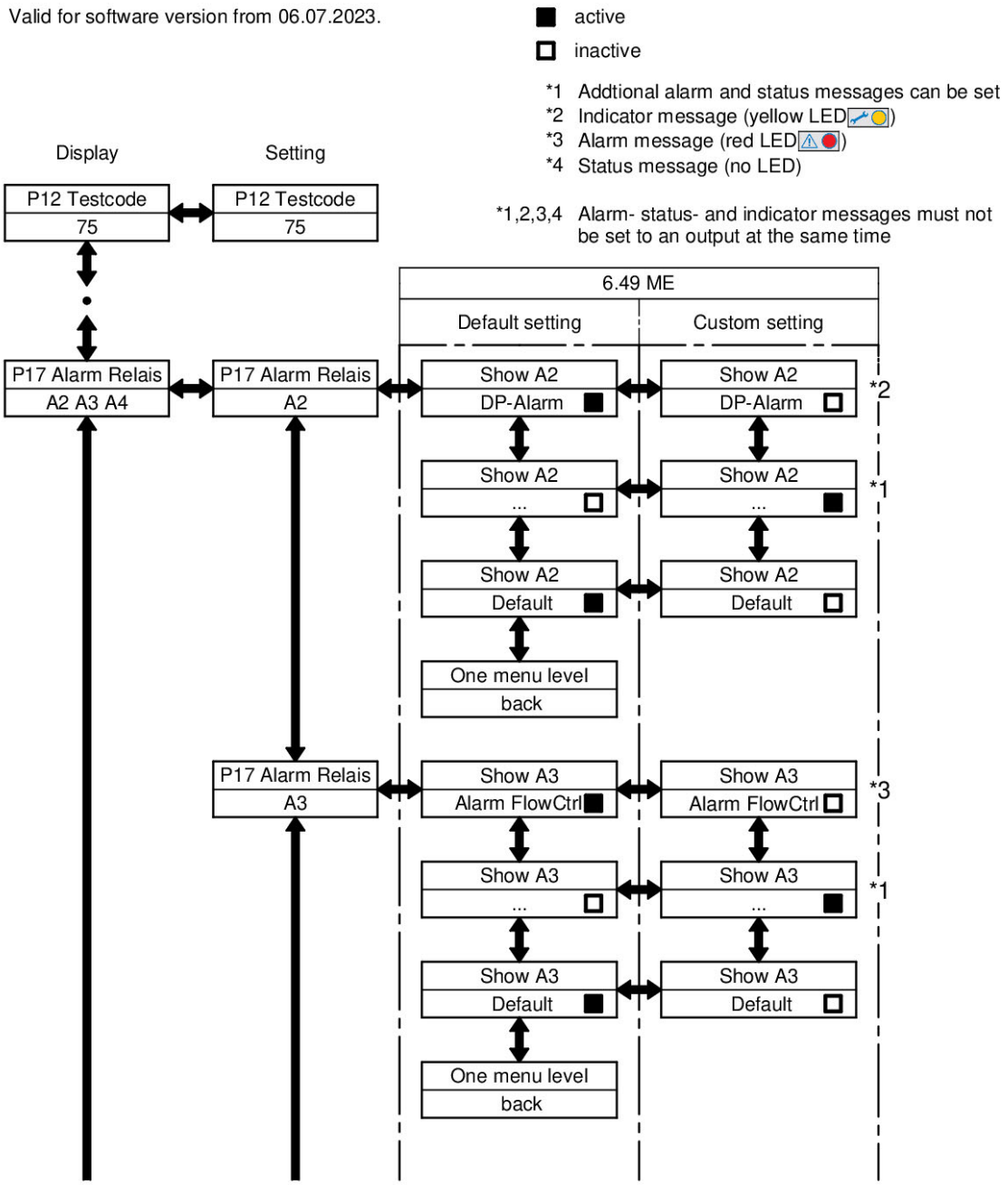

Valid for software version from 06.07.2023.
active
inactive
*1 Addtional alarm and status messages can be set
*2 Indicator message (yellow LED)
*3 Alarm message (red LED)
*4 Status message (no LED)
*1,2,3,4 Alarm- status- and indicator messages must not be set to an output at the same time
Display
Setting
P12 Testcode
75
P12 Testcode
75
6.49 ME
Default setting
Custom setting
P17 Alarm Relais
A2 A3 A4
P17 Alarm Relais
A2
Show A2
DP-Alarm
Show A2
DP-Alarm
*2
Show A2
...
Show A2
...
*1
Show A2
Default
Show A2
Default
One menu level
back
P17 Alarm Relais
A3
Show A3
Alarm FlowCtrl
Show A3
Alarm FlowCtrl
*3
Show A3
...
Show A3
...
*1
Show A3
Default
Show A3
Default
One menu level
back

Fig. 5-13 P17

Valid for software version from 06.07.2023.

■ active
□ inactive

*1 Addtional alarm and status messages can be set
*2 Indicator message (yellow LED)
*3 Alarm message (red LED)
*4 Status message (no LED)

*1,2,3,4 Alarm- status- and indicator messages must not be set to an output at the same time

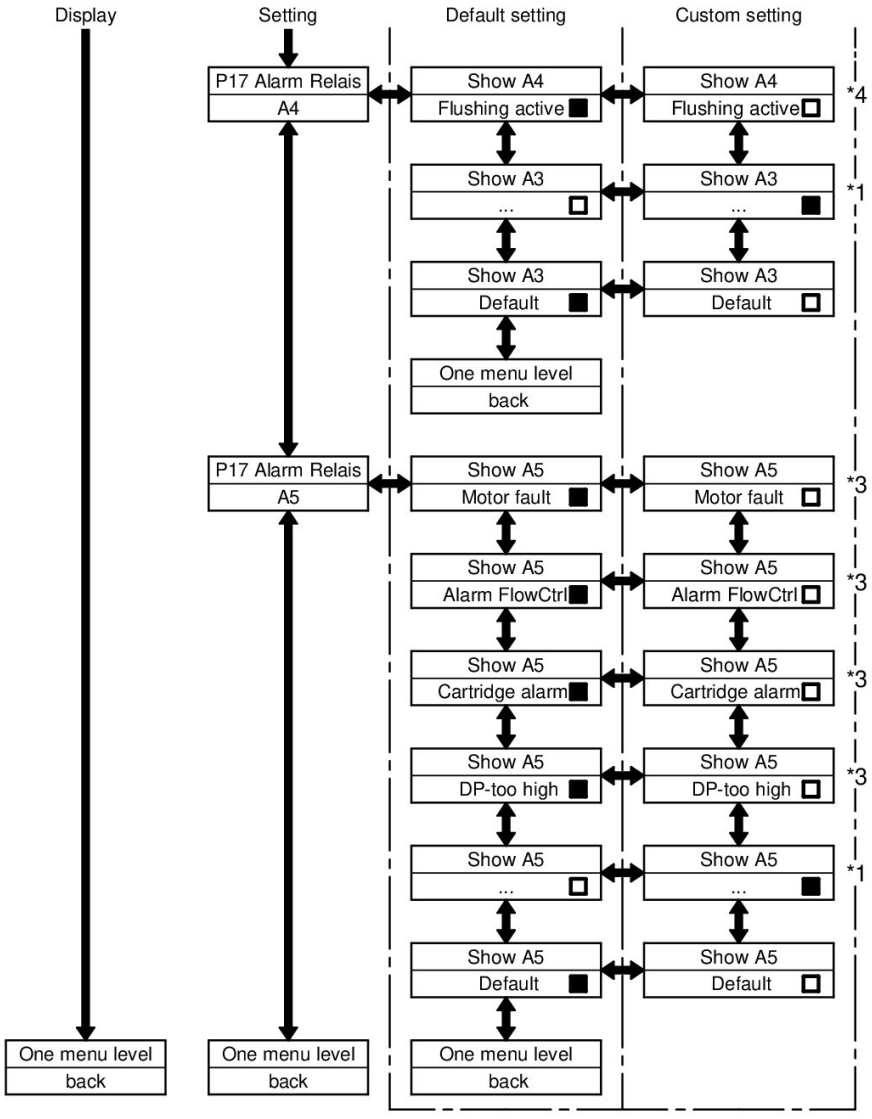


Fig. 5-14 P17

NOTE

Parameter P17 in controller version V1.0/V1.1 is explained as an example using Fig. 5-13 and 5-14.

From controller version V2.0, additional alarms (motor 1 fault, motor 2 fault, pump motor fault and valve fault) are available, which are analysed using the additional board.

5.5.12 P20 pump delay

Adjustable in seconds	Range 1-10s
Factory setting	Initial value 5s
Text display, line 1	**P20 pump delay**
Text display, line 2	**XXX seconds**

NOTE

From controller version V2.0, due to the alternating backflushing of filters 1 + 2, the pump delay is shown differently on the display depending on the flushed filter chamber, as the changeover time of the 3-way valve must be added to this.

5.5.13 P21 refill oil (only applies to V1.0/V1.1)

NOTE

From controller version V2.0, parameter P21 is no longer available, as this function has never been used in operation.

NOTE

Selecting ON for parameter P21 immediately switches the controller to “Refill oil” mode.

(For a detailed description of operation, see Fig. 5.15).

Setting	Off / On
Factory setting	Initial value OFF
Text display, line 1	P21 Refill oil
Text display, line 2	OFF
or	
Text display, line 2	ON

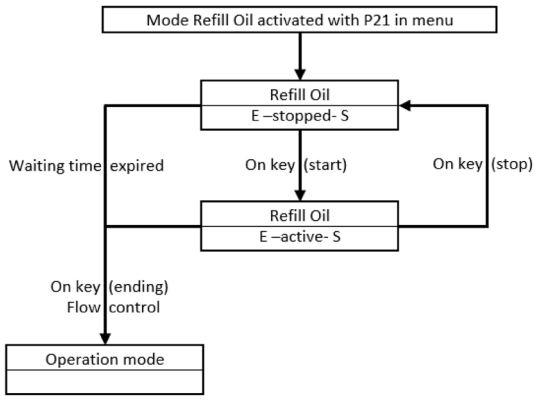


Fig. 5-15 Refill oil

NOTE

Pump and solenoid valve stopped initially.
The process can be switched on using the down key. Pressing the ▼ key again stops the process once more.

The process can be switched on using the ▼ key. Pressing the ▼ key again stops the process once more.

The controller is now back in the initial state for “Refill oil” operating mode.

If no keys are pressed for two minutes while the process is stopped, the controller exits “Refill oil” mode and switches back to regular operating mode. Regardless of the status (stopped or active) the controller switches back to regular operating mode if the ▲ key is pressed, the menu is opened, or the flow monitor is triggered. The pump and solenoid valve are switched off in the process. It is not possible to acknowledge alarms and notifications, to start flushing procedures, or to access operating parameters while “Refill oil” mode is active.

5.5.14 P22 pressure switch (only applies to V1.0/V1.1)

NOTE

From controller version V2.0, parameter P22 is no longer available, as the pressure switch is not an optional component.

The pressure switch analysis is carried out via input E4 by default and can no longer be deactivated.

NOTE

This parameter can be used to set whether a pressure switch is installed on the filter. If a pressure switch is installed, the bridges in the terminal box installed by default must be removed, see circuit diagrams:

Setting	Off / On
Factory setting	Initial setting "On"
Text display, line 1	**P22 pressure switch**
Text display, line 2	**OFF**
or	
Text display, line 2	**ON**

6 Control box description, function and setting values

When the DPI (or the optional differential pressure transmitter) emits a signal, this means that 75% of the permitted ΔP value has been reached for the filter. In this case, the backflushing process is triggered. During the flushing process, motors 1 and 2 should run at only nominal speed for the duration of flushing X (in seconds), which can be set from 30 - 300s.

Each flushing arm motor is secured separately by a motor protection switch.

The pump motor starts (motor 3) with a configurable delay of 1 - 10s and runs constantly at its nominal speed for the remaining duration of the flushing procedure.

Applies to controller version V1.0:

With the help of the solenoid valves, the two filter chambers are flushed one after the other. The chamber flushing time can be configured using the integrated time relay -KF1. During the first half of the remaining backflushing time (parameter P4), valve 1 (MA1) is open and valve 2 (MA2) is closed. During the second half, valve 2 is open and valve 1 is closed. Both valves are closed and the motors do not rotate when no flushing is in progress.

Applies to controller version V1.1:

With the help of the 3-way valve, the two filter chambers are flushed one after the other. The chamber flushing time can be configured using the integrated time relay -KF1. During the first half of the remaining backflushing time (parameter P4), there is an open connection between filter 2 and the pump for carrying out the backflushing, as the 3-way valve can not yet be controlled electrically. During the second half, the 3-way valve is controlled electrically, taking the changeover time into account; this enables an open connection between filter 1 and the pump to implement backflushing.

Once the backflushing has ended, the control of the 3-way valve and the motors is stopped. The connection between filter 2 and the pump is always open and the motors do not rotate when no flushing is in progress.

Applies to controller version V2.0:

With the help of the 3-way valve, the two filter chambers are flushed one after the other, which is controlled via valve output 1 on the control circuit board. During the first half of the remaining backflushing time (parameter P4), there is an open connection between filter 2 and the pump for carrying out the backflushing, as the 3-way valve can not yet be controlled electrically. During the second half, the 3-way valve is controlled electrically, taking the changeover time into account; this enables an open connection between filter 1 and the pump to implement backflushing.

In comparison to controller version V1.1, the backflushing has been optimised with an alternating control of the 3-way valve, i.e. with the help of this control, filters 1 and 2 are always controlled alternately. Therefore, parameter P20 pump delay (standard = 5 s) is different because the changeover time of the 3-way valve (standard = 10 s) on a filter chamber must be added. Changing the pre-programmed changeover time is only intended for authorised persons.

Once the backflushing has ended, the control of the 3-way valve and the motors is stopped. The connection between filter 2 and the pump is always open and the motors do not rotate when no flushing is in progress.

Parameter engineBoll 6.49 ME for V1.0 / V1.1 / V2.0:

		engineBoll 6.49 ME				
		V1.0	V1.1	V2.0	V2.0	V2.0
P0	Filter type	6.49 ME		6.49 ME DN 50	6.49 ME DN 65-150	6.49 ME DN 200
P2	forced flushing	2h				
P3	forced flushing	0min				
P4	Backflushing time	DN50=30s DN65-150=60s DN200=120s *)	DN50=30s DN65-150=60s DN200=120s *)	30s *1)	60s *1)	120s *1)
	Time relay -KF1	see **5.5.4.1 Time relay KF1 (only applies to V1.0/V1.1)**		/		
P7	Delay time cartridge alarm	20s				
P8	-	DP alarm = On/Off Factory setting: ON		DP flush. Info = On/Off Factory setting: ON		
P11	Language	D, EN Factory setting: EN				
P12	Test code	See **5.5.8 P12 Testcode**				
P15	DP selection DPS or DPT	DPS or DPT Factory setting: DPS				
P16	Delay time Differential pressure	On/Off Factory setting: OFF				
P17	Alarm relays	See **5.5.11 P17 alarm relays A2, A3, A4, A5 (configurable alarm outputs)**				
P20	Pump delay	1 - 10 s Default setting 5s				
P21	Refill oil	See **5.5.13 P21 refill oil (only applies to V1.0/V1.1)**		not available		
P22	Pressure switch	Setting: On or Off Factory setting: ON		P22 is no longer available, the pressure switch is permanently analysed.		

*) The backflushing time P4 deviates in the case of controller version V1.1 as compared to V1.0, as the changeover time for the 3-way valve must be taken into account with V1.1.

*1) The backflushing time P4 deviates in the case of controller version V2.0 compared to V1.1, as in V2.0, the changeover time for the 3-way valve has been taken into account in the software.

6.1 Alarm outputs

Old version "Software version UNTIL 06/07/2023"
(Applies to controller version V1.0 and V1.1)

Messages	Alarm output A2	Alarm output A3	Alarm output A4	Alarm output A5
DP alarm (yellow LED)				X
Flow monitor alarm (red LED)		X		
Flushing active (no LED)			X	
motor fault (red LED)				X
cartridge alarm (red LED)				X
DP too high (red LED)	X			X

New version "Software version FROM 06/07/2023"
(Applies to controller version V1.0 and V1.1)

Messages	Alarm output A2	Alarm output A3	Alarm output A4	Alarm output A5
DP alarm (yellow LED)	X			
Flow monitor alarm (red LED)		X		X
Flushing active (no LED)			X	
motor fault (red LED)				X
cartridge alarm (red LED)				X
DP too high (red LED)				X

NOTE

The indicator message (DP alarm [flushing frequency monitoring] = yellow LED) and alarm message (DP too high = red LED) have been divided from software version 06/07/2023.

New version "Software version FROM 13/06/2024"

(Applies to controller version V2.0)

Messages	Alarm output A2	Alarm output A3	Alarm output A4	Alarm output A5
Flushed by DP (yellow LED)	X			
Flow monitor alarm (red LED)		X		X
Flushing active (no LED)			X	
cartridge alarm (red LED)				X
DP too high (red LED)				X
Motor 1 fault (red LED)				X
Motor 2 fault (red LED)				X
Oil pressure fault (red LED)				X
Pump motor fault (red LED)				X
Valve fault (red LED)				X

NOTE

The indicator message (DP alarm [flushing frequency monitoring] = yellow LED) has been changed from software version V2.0 to "Flushed by DP", so that this indicator message (yellow LED) cannot be confused with the alarm message (DP too high = red LED).

7 Monitoring and fault messages

In order to prevent the pump from running dry and to monitor the valves, the flushing procedure is aborted and a fault message is issued whenever the flow monitor fails to emit a signal for more than 5 seconds. For this purpose, the flow monitor is connected to a digital input on controller 2300 ME.

If no ΔP-dependent flushing procedure is triggered within a certain period of time, a time-dependent flushing procedure is initiated. The interval can be configured freely.

When the DPI2 (or the optional differential pressure transmitter) emits a signal, this means that 100% of the permitted ΔP value has been reached for the filter. In this case, the controller triggers an alarm which can be picked up and forwarded to the ship controller.

If a differential pressure transmitter (optional) is used, the ΔP values for 75% and 100% can be set on the controller.

During operation, it is possible to track whether the backflushing was successful for the two filter elements. Because backflushing only works if the motors are operating smoothly, an alarm message is output by the controller as soon as one of the motors 1, 2, or 3 malfunctions. This is done via a collective message; it is possible to determine which motor has malfunctioned based on the motor protection switch. The controller contains only the program for the filter type engineBoll 6.49 ME.

When the DPI 3 emits its signal for the set ΔP value, the “Cartridge alarm” message is shown in the controller. A delay time can be set for this cartridge alarm. The optional pressure switch monitors whether there is any operating pressure on the filter and also outputs a collective message. An LED on the pressure switch turns on when there is pressure on the filter.

Applies from controller version V2.0:

From V2.0, the alarms for gear motors 1 + 2, the pump and the oil pressure switch are analysed separately using the additional board and shown on the display. The oil pressure switch is used as a standard component and is no longer optional.

The motor protection switches for gear motors 1 + 2 are no longer necessary as the motor is monitored by the internal software of the motors and analysed by the additional board.

8 Service

8.1 Contact for spare parts and service

Please always quote our order no. when ordering spare parts. You will find the order number on the nameplate of the filter. Please contact our spare parts sales department at spareparts@bollfilter.com.

Should you require our services, please contact our service team at +49 2273/ 562-222 or service@bollfilter.com.

8.2 Special safety instructions

DANGER!

Risk of accidents due to improper maintenance

A failure of the device resulting from improper maintenance (replacement of electric components) of the control box could cause the failure of the device, severe personal injury or even fatal injury. Therefore, in addition to the general safety rules for equipment in industrial power installations, comply with the following points in particular:

- The maintenance of the control box should only be performed by qualified specialist staff in accordance with the conditions of IEC 364 and DIN VDE 0105 for electrical equipment.

NOTE

Refer to the control cabinet diagrams for the spare parts for the control box.

DISPOSAL

Observe the regulations for environmental protection. Make sure that the removed components are disposed of properly and in an environmentally friendly manner.

9 Remedying faults

9.1 Trouble shooting

Fault	Possible cause	Remedy
Automatic filter not activated	Defective wiring	Check wiring and transformer supply settings based on circuit diagram
Display keys not working	Keypad damaged	Replace display A1
	Connection cable between circuit board and display loose	Plug cable back in
	Connection cable between circuit board and display defective	Replace connection cable
Display screen not working	Faulty power supply	Check supply and make sure primary voltage is set correctly on transformer T1
	Connection cable between circuit board and display loose	Plug cable back in
	Connection cable between circuit board and display defective	Replace connection cable
	Display A1 defective	Replace display A1
	Transformer T1 defective	Replace transformer T1
	circuit board A2 defective	Replace circuit board A2
	Fuse(s) F1 and/or F2 (1 amp) defective	Replace fuse(s)
Gear motor not rotating + “motor fault” alarm	Malfunction on filter (gear motor, etc.)	See operating instructions for automatic filter engineBoll 6.49 ME
	Defective wiring	Check wiring on gear motor
Differential pressure not being processed	Differential pressure indicator faulty	Check/Replace differential pressure indicator
	Parameter P16 time delay for differential pressure set	See descriptions of time delay for differential pressure, settings for parameter P16, and additional function display (key C) in the operating instructions
Solenoid valve including coil does not work (only applies to control version V1.0 - see section **6 Control box description, function and setting values**)	Incorrect control/valve voltage set	Compare coil voltage with configured secondary voltage on transformer and correct if necessary
	Fuse F2 (2 amps) on circuit board A2 defective	Replace fuse
	Solenoid valve and/or coil defective	Replace solenoid valve and/or coil

Fault	Possible cause	Remedy
3-way valve does not work (only applies to controller version V1.1 + V2.0 - see section **6 Control box description, function and setting values**)	Valve faulty	Replace faulty part
	Fuse -F1 for protecting the 3-way valve is defective (applies from V2.0)	Replace the fuse -F1 in the switch cabinet (see **4.1.4 Fuse protection**)
“Valve fault” alarm message (applies from V2.0)	End positions of the 3-way valve were not reached when switching. Limit switch defective (2 per valve) or input DI4 was not connected correctly.	Check digital input DI4 on the additional board
		Replace faulty part
Motor 1 fault and/or Motor 2 fault as well as red motor LED lights up	Motor 1 and/or motor 2 faulty	Check the wiring (see details in section “Motor fault - M1, -M2” or the operating instructions for automatic filter engineBoll 6.49 ME).
		Replace faulty part
Flow monitor alarm	Flow monitor does not detect any flow	Make sure flow monitor is working